

Microelectronic Processing with Vacuum Ultraviolet Radiation (VUV)

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- The objectives of this work are (1) to eliminate excess charge which can destroy microstructures during plasma processing by exposure to vacuum ultraviolet radiation and (2) to substitute processing with vacuum ultraviolet radiation for plasma processing

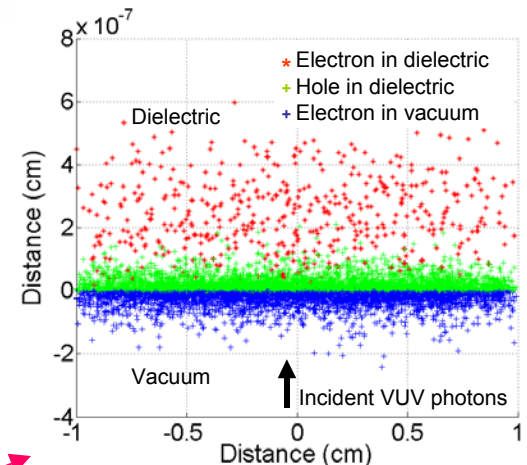
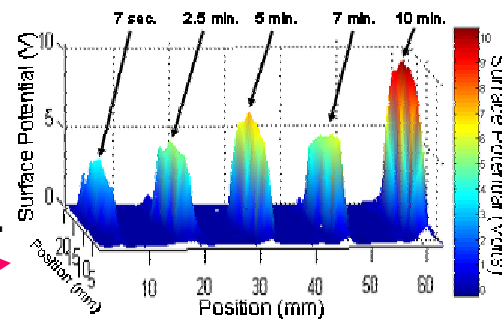
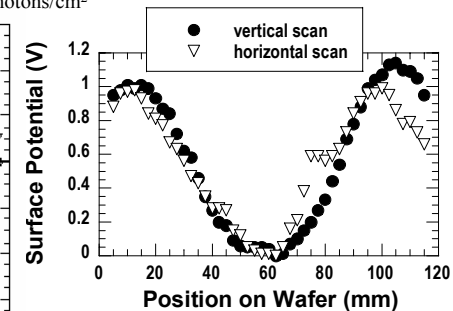
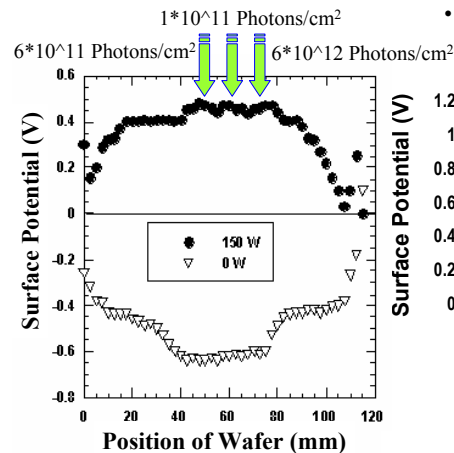
- We have discovered that exposure of charged dielectrics to VUV depletes the charge by introducing a temporary increase in the photoconductivity of the dielectric. The right-hand figure shows the charge remaining after VUV exposure. The charge distribution is measured by use of a Kelvin Probe which is a vibrating capacitor. This is used to produce a charge “map”.

Depletion of Plasma-Induced Charge

Before VUV Exposure

After VUV Exposure

• All exposures used 15 eV photons



- A Monte-Carlo simulation of VUV incident on a dielectric produces electrons and holes around the surface of the dielectric.

Education and Outreach

- This work involves the collaboration of four graduate students, Jason Lauer and Ganesh Upadhyaya, Richard Bathke and Khanfer Kukkady, two undergraduate students, Joseph Kalwitz, Eli Sheets and a student in the electron microscopy program of the Madison Area Technical College, Bob Hafner. In addition, during the summer, our laboratory hosted research internships for one undergraduate student, Chris Walker, Clark Atlanta University and Lemuel Shelley from an Atlanta, GA high school.



Chris Walker and Lemuel Shelley are shown here installing a sample to be exposed to VUV radiation at the UW-Madison Synchrotron Radiation Center which is supported by NSF under grant DMR—0084402.